

Notice of Allowability

Application No.

09/431,758

Applicant(s)

MURPHY ET AL.

Examiner

Art Unit

William C. Vaughn, Jr.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 12 October 2004.
2. ☒ The allowed claim(s) is/are 1, 3, 4, 8-16, 19, 21-24, 29-34, 36, and 38-43. Renumbered 1-30.
3. ☒ The drawings filed on 11/01/04 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☒ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☒ to Paper No./Mail Date 5.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date 12 October 2004.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

William C. Vaughn, Jr.
Primary Examiner
Art Unit 2143
William C. Vaughn, Jr.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Barry Chapin, Reg. 39, 934 and Paul P. Kriz, Reg. No. 45,752 on 12 October 2004.

IN THE CLAIMS

Please cancel claims 2, 5-7, 17, 18 and 20, 25-28, 35 and 37 without prejudice or disclaimer.

Please amend claim 1, 3, 4, 14, 16, 29, 30, 32-34, 36, 38 and 40-43 as follows:

1. (Presently Amended) A network architecture for management of a storage area network by at least one client which is independent of the storage area network, the network architecture comprising:

a storage system including a plurality of storage devices;

a plurality of host computers connected to the storage system through a first communications network, the host computers including corresponding agents for gathering operation status information associated with the storage area network;

at least one storage management server in communication with the plurality of host computers via the corresponding agents to retrieve the operation status information, the at least one storage management server being adapted to communicate with the at least one client via a web-based second communications network; and

the at least one storage management server providing the operation status information received from the corresponding agents to the at least one client via use of the web-based second communications network and an object request broker in the at

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least one storage management server for ensuring that the at least one client is able to access the at least one storage management server, wherein the at least one storage management server further provides information relating to an operation status of storage connectivity devices, which connect storage devices to the host computers, based on communications with the agents; and the at least one storage management server including:

a poller for gathering information relating to an operation status of the storage devices and the storage connectivity devices; and

a central repository for storing the operation status information;

an object server for distributing the information relating to an operation status of the storage devices and storage connectivity devices to the at least one client.

2. (Canceled) ~~The network architecture of claim 1 wherein the storage management server includes:~~

~~a poller for gathering the operation status information from the corresponding agents; and~~

~~a central repository for storing the operation status information relating to an operation status of the storage devices; and~~

~~an object server for distributing the operation status information to the at least one client.~~

3. (Presently Amended) The network architecture of claim 1 ~~claim 2~~ wherein the poller polls the corresponding agents at predetermined intervals to maintain a current status of an operation of the storage devices.

4. (Previously Presented) The network architecture of claim 3 wherein the predetermined intervals are less than one minute.

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5. (Canceled) ~~The network architecture of claim 1 wherein the at least one storage management server provides the at least one client information relating to an operation status of storage connectivity devices which connect the storage devices to the host computers.~~

6. (Canceled) ~~A network architecture for management of a storage area network by at least one client which is independent of the storage area network, the network architecture comprising:~~

~~a storage system including a plurality of storage devices;~~

~~a plurality of host computers connected to the storage system through a first communications network, the host computers including corresponding agents for gathering operation status information associated with the storage area network;~~

~~at least one storage management server in communication with the plurality of host computers via the corresponding agents to retrieve the operation status information, the at least one storage management server being adapted to communicate with the at least one client via a web based second communications network; and~~

~~the at least one storage management server providing the operation status information received from the corresponding agents to the at least one client via use of the web based second communications network and an object request broker in the at least one storage management server for ensuring that the at least one client is able to access the at least one storage management server;~~

~~wherein the at least one storage management server further provides information relating to an operation status of storage connectivity devices which connect storage devices to the host computers via communications with the agents; and the at least one storage management server including:~~

~~a poller for gathering information relating to an operation status of the storage devices and the storage connectivity devices; and~~

~~a central repository for storing the information; and~~

~~an object server for distributing the information relating to an operation status of the storage devices and storage connectivity devices to the at least one client.~~

7. ~~(Canceled) The network architecture of claim 6 wherein the poller polls the storage connectivity devices at predetermined intervals to maintain a current status of operation of the storage connectivity devices.~~
8. (Previously Presented) The network architecture of claim 1 wherein the at least one storage management server further includes a security component for limiting access by the at least one client to the storage devices.
9. (Previously Presented) The network architecture of claim 1 wherein the at least one storage management server further includes a web server for communicating with the at least one client.
10. (Previously Presented) The network architecture of claim 1 wherein each of the at least one client includes a graphical user interface for displaying information relating to an operation status of the storage devices.
11. (Previously Presented) The network architecture of claim 1 wherein the at least one host computer includes a plurality of host computers, the host computers running different types of operating systems.
12. (Original) The network architecture of claim 1 wherein the plurality of storage devices are of different types.
13. (Previously Presented) The network architecture of claim 1 further comprising a plurality of storage management servers, each connected between the host computers and a plurality of clients, each storage management server providing information relating to an operation status of the storage devices to the plurality of clients.

14. (Presently Amended) The network architecture of claim 1 wherein the at least one management server includes at least two management servers, each of the at least two ~~one storage management servers including: server includes:~~
 - a poller for gathering the operation status information relating to an operation status of the storage devices;
 - a central repository for storing the operation status information; and
 - an object server for distributing the information relating to the operation status of the storage devices to the at least one client, wherein the object server and the at least one client communicate via use of the object request broker.
15. (Previously Presented) The network architecture of claim 14, wherein the at least one storage management server includes a plurality of storage management servers, the network architecture further comprising a name server, which is connected to communicate with the plurality of storage management servers to determine which central repository of the plurality of storage management servers includes information relating to an operation status of a given one of the storage devices.
16. (Presently Amended) A method of managing a storage area network by at least one client independent of the storage area network, the storage area network including:
 - a storage system including a plurality of storage devices;
 - a plurality of host computers connected to the storage system through a first communication network, each host computer capable of transmitting data to and retrieving data from at least one of the plurality of storage devices;
 - the method comprising:
 - providing a storage management server between the at least one client and the plurality of storage devices, the storage management server being adapted to connect to the at least one client via a web-based second communication network and being in communication with the plurality of host computers via corresponding agents in the host computers;

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~~providing to the storage management server from at least one of the corresponding agents information relating to a configuration of the storage system;~~

~~at the storage management server: i) gathering information relating to an operation status of the plurality of storage devices and the storage connectivity devices based on communications with the corresponding agents, the storage connectivity devices connecting the host computers the storage devices, and ii) storing the operation status information in a central repository;~~

~~via an object server of the storage management server, distributing the operation status information relating to an operation status of the storage devices and the storage connectivity devices to the at least one client; collecting information from the corresponding agents, the information relating to the configuration of the storage system; and~~

~~from the storage management server, providing the information to the at least one client, wherein the storage management server and the at least one client communicate via an object request broker in the storage management server for ensuring that the at least one client is able to access the storage management server.~~

17. ~~(Canceled) The method of claim 16 wherein providing the information relating to the operation status of the storage devices includes using a poller to gather the information relating to an operation status of the storage device, the method further comprising storing information relating to an operation status of said one of the storage devices in a central repository of the storage management server.~~
18. ~~(Canceled) The method of claim 16 wherein providing the information relating to the configuration of the storage system includes using an object server to distribute the information relating to an operation status of the storage devices to the clients.~~
19. (Previously Presented) The method of claim 16 further comprising polling the storage devices at predetermined intervals to maintain a current status of the configuration of the storage system.

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20. (Canceled) ~~The method of claim 16 further comprising providing information relating to an operation status of storage connectivity devices which connect the host computers to the storage devices.~~
21. (Previously Presented) The network architecture of claim 1 wherein the second communications network is an Intranet.
22. (Previously Presented) The network architecture of claim 1 wherein the first communications network is a Fibre Channel network.
23. (Previously Presented) The method of claim 16 wherein the second communications network is an Intranet.
24. (Previously Presented) The method of claim 16 wherein the first communications network is a Fibre Channel network.
25. (Canceled)
26. (Canceled)
27. (Canceled)
28. (Canceled) In a management server associated with a storage network, a method comprising:
 - ~~communicating with multiple host computers that service requests for access to storage devices in the storage network, the host computers including agents to gather operation status information relating to an operation status of the storage devices;~~
 - ~~retrieving the operation status information from the host computers;~~

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~~storing the retrieved operation status information in an object store associated with the management server; and~~

~~providing the operation status information in the object store of the management server to at least one client over a communication network that operates independent of the storage network.~~

29. (Presently Amended) A method as in claim 16 ~~claim 28~~, wherein the operation status information indicates that a particular channel in the storage area network is inundated with traffic as a result of a large number of I/O (Input/Output) requests, the method further comprising:

notifying a given client of the at least one client about an occurrence of the large number of I/O requests, the given client, in turn, opting to run an application using another storage system to improve data throughput.

30. (Presently Amended) A method as in claim 16 ~~claim 28~~ further comprising:

via the storage management server, providing the operation status information to the at least one client, facilitating distribution of management responsibilities among multiple clients, which have different responsibilities and access rights with respect to objects in the central repository ~~object store~~ of the management server.

31. (Previously Presented) A method as in claim 30, wherein the operation status information includes at least one of type, properties and status of storage connectivity devices in the storage network.

32. (Presently Amended) A method as in claim 16 ~~claim 28~~, wherein distributing ~~providing~~ the operation status information enables a client of the at least one client to check a status of resources of the storage area network that affects a throughput of data requested from the plurality of storage devices.

33. (Presently Amended) A method as in claim 16 ~~claim 28~~ further comprising:

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via the storage management server, operating in conjunction with another storage management server to manage and distribute operation status information to the at least one client.

34. (Presently Amended) A method as in claim 16 ~~claim 28~~ further comprising:
providing a naming service to determine whether the storage management server, which is part of a group of storage management servers, includes information relating to a storage device of interest as specified by a particular client.

35. (Canceled) ~~A method as in claim 28 further comprising:
polling the agents at the host computers to retrieve and maintain current operation status information associated with the storage network.~~

36. (Presently Amended) A method as in claim 16 ~~claim 28~~ further comprising:
limiting access to the operation status information in the management server to clients with appropriate privileges.

37. (Canceled) ~~A method as in claim 28 further comprising:
providing communications to the at least one client via an object request broker in the management server.~~

38. (Presently Amended) A method as in claim 16 ~~claim 28~~, wherein the storage network includes connectivity devices for forwarding data packets, between the host computers and the storage devices, to appropriate ports based on addresses of the data packets; and
wherein retrieving the operation status information from the host computers includes initiating communication with the host computers to discover a configuration associated with ~~the~~ at least one of the host computers ~~computer~~, storage devices, and connectivity devices associated with the storage network.

39. (Previously Presented) A method as in claim 38 further comprising:

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initiating communication with a given agent of a corresponding host computer to identify a date and time associated with a detected change to the configuration.

40. (Presently Amended) A method as in claim 16 ~~claim 28~~ further comprising:

identifying a configuration change to the storage area network which includes a change associated ~~associate~~ with at least ~~leas~~ one of: i) the ~~at least one~~ host computers ~~computer~~, ii) the storage devices, and iii) the ~~connectivity devices between the host computers and the storage devices~~;

based on detecting the configuration change, notifying an appropriate client registered to be notified of an occurrence of the configuration change.

41. (Presently Amended) A method as in claim 16 ~~claim 28~~, wherein distributing ~~providing~~ the operation status information ~~in the object store of the management server~~ to a given client enables the given client to generate, on a corresponding user's display screen, a topology map identifying a configuration of resources associated with the storage area network.

42. (Presently Amended) A method as in claim 41, wherein providing the operation status information enables the given client to display a topology map illustrating connectivity of the ~~the~~ storage systems, the ~~the~~ host computers, and the connectivity devices ~~switches~~ associated with the storage network.

43. (Presently Amended) A method as in claim 42, wherein the corresponding user's display screen includes a sub-window listing storage arrays of the storage area ~~-~~network accessible by the given client.

Reasons for Allowance

2. The following is an examiner's statement of reasons for allowance: Because the closest prior art of record does not teach nor suggest in detail the recited newly amended claims as well

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as in combination all of the limitations (see Applicant's arguments dated 14 July 2004, on pages 15-21, as well as the enabling portions of Applicant's specification, pages 5-9).

3. The dependent claims further limit the independent claims and are considered allowable on the same basis as the independent claims as well as for the further limitations set forth.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee.

Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

4. **Claims 1, 3, 4, 8-16, 19, 21-24, 29-34, 36, 38-43** are allowable. Renumbered 1-29.

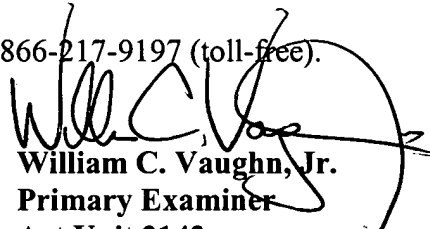
Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Vaughn, Jr. whose telephone number is (703) 306-9129. The examiner can normally be reached on 8:00-6:00, 1st and 2nd Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David A Wiley can be reached on (703) 308-5221. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



William C. Vaughn, Jr.
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WCV